PEO C3T
Technology Needs and How to Fulfill Them?

Kay Griffith-Boyle
SE&I – Futures Office Chief
Office: 732-427-0634
Linda.GriffithBoyle@us.army.mil

Objective

- Take the opportunity to present technology needs to the U.S. industry and small businesses.
- To solicit applicable Commercial Off-the-Shelf (COTS) solutions, as well as to influence future product/service offerings and Independent Research and Development (IR&D) investments.

Contract Opportunity

- Vendors who have potential technical solution for fulfilling these technology needs can
  1. Arrange one-to-one private discussion; and/or
  2. Respond to the upcoming Request for Information (RFI) or Broad Agency Announcement (BAA).
- Proposed solutions will be evaluated and assessed by the systems engineering team. Recommended technical solutions will be considered for potential procurement opportunity.

Systems Engineering & Integration Division (SE&I)

SE&I

Title: Enhancing C2 Operational Capabilities in a Counter IED Environment

Description: Counter IED tactics are threat driven and evolving. The counter IED systems require better linkage to the C2 systems to enhance the operational effectiveness of both C2 and counter IED. It is anticipated that a viable solution(s) could address both the C2 and Counter IED systems.

Specific Areas of Interest / Current Status:

- Specific areas of interest include (but not exclude the others) common timing protocol, common data ontology/architecture, data standards, data mining/filtering, data fusion, predictive analysis, and enhancing distribution of relevant intel data to C2 systems.

SE&I

Title: Tactical Cross Domain Solutions (TCDS)

Description: PEO C3T system users have varying security clearances and “need to know” access, and operate in a mobile tactical environment. The need to exchange command and control information requires that our systems operate with various levels of classified data. While expensive and large systems exist to provide a cross domain solution for fixed installations, a cost effective solution is required for the tactical environment.

SE&I

Title: Current Force Quality of Service (CF-QOS)

Description: Quality of service in the current force is addressed as part of the initial system engineering process. In reality, the user's actual quality of service can be much worse than projected because individual applications and the network lack control to support quality of service in the real time.

Project Director Counter Rocket, Artillery, and Mortar (PD C-RAM)

PD C-RAM

Title: Rocket Artillery and Mortar (C-RAM) Lightweight Intercept Capability

Description: Current Intercept systems requires 360 degree capability and FCS-class mobility. Current C-RAM architecture requires two intercept systems (i.e., Land-Based Phalynx Weapon System, LPWS) at a given site. Current LPWS requires the following: -- High Probability of Kill (Pk) at extended ranges against all RAM threats. -- FCS-class mobility (travel with maneuver forces). -- Multiple, simultaneous engagement capability (coordinated attacks). -- Small operation (force structure) and sustainment (logistics) footprint.

PD C-RAM

Title: C-RAM Multi-Mission Radar

Description: A new mission has emerged as a result of OIF that includes: sense and track rockets, artillery and mortar targets; warn troops on the ground and cue current and future interceptors. Additionally, the recent Israeli conflict with the Hezbollah indicates a need for an ability to locate fires and track long range rockets. A need exists for a new radar that combines counter-fire and long range rocket detection capabilities with air surveillance functionality. This radar should have the capability to provide continuous 360 degree azimuth coverage of all threats including: air targets, mortars, rockets, artillery, and cruise missiles. This radar should provide the classification of the target (mortar, rocket, artillery, FW/RW) to aid in the determination of situational alternatives.

Product Manager Network Operations – Current Force (PdM NETOPS-CF)

PdM NETOPS-CF

Title: Integrated Modular Network Operations

Description: The integration of individual network management, information assurance and flow management tools into a single automated capability. The requirement is for a management capability to plan, monitor, assess, secure and visually display the "Heart-beat of the Network."

Specific Areas of Interest:

- Consistent NetOps data structures, application program interfaces frameworks that will foster network management interoperability and seamless modular integration of diverse toolset capabilities.
- NetOps Dashboard graphic user interface designed to leverage the cognitive psychology preferences inherent to the military occupational skills of Network Operators across Joint, Global Information Grid, Land Warfare Network, and Enterprise.

PdM NETOPS-CF

Title: Task Organization and Initialization

Description: The Army and all DoD components require a capability that provides a "high availabilty service" to disseminate initialization data products to tactical forces (US, Joint, or Coalition for combat and combat support units).

Specific Areas of Interest:

- Initialization data dissemination application performance and Quality of Service
- Network provisioning and reprovisioning rapid and large scale

PdM NETOPS-CF

Title: Force Network Health Analysis & Optimization

Description: Changes in battlefield dynamics may cause new link, bandwidth and routing issues that cannot be adequately addressed by traditional static network rule-sets. Battlefield conditions change dynamically and can cause surges in network demand that are more difficult to mitigate with traditional techniques. Improvements in monitoring and adjusting complex network QoS metrics, on the fly, to improve the mitigation of operational network traffic surges in near real-time would be beneficial to the Army.

Specific Areas of Interest:

- Intelligent agents for Network QoS metrics identification and activation relevant to specific services or service types that are dominant consumers in the network.
- Proactive IA solutions capable of monitoring attack trends across a network domain to establishes firewall settings in an automated fashion to proactively prevent or mitigate an attack's consequence.
- Gauging Intelligent agent and network health monitoring overhead to define acceptable levels.

Project Manager
Battle Command (PM BC)

PM Battle Command

Title: User Interface/Presentation-Liquid Information

Description: Provide liquid information such that Commanders can access, view, configure and tune data, visualization, workspace and processes in ways that support their thinking. Support thought visualization process such that Commanders are assisted by the computer in sketching and gesturing to express thoughts and understanding to others. For example, translating non-standard graphics to standardized symbology helps automate the translation of commander's intent-type graphics into standardized formal symbology for subsequent operational execution and interoperability. Research in context-aware assistive computing will help model and further develop accurate and robust sensing, filtering, aggregation, and visualization capabilities. People are key participants in systems and many problems in complex systems today stem from failures at the individual and organizational level requiring research in human computer interaction (HCI) on user centered specifications and on modeling user behaviors in system of system communities. For example, exploring if three-dimensional rendering detracts from a human being's ability to interpret certain types of data/information and/or data/information trends? (ex. can a user more easily analyze and understand several two dimensional bar graphs vice one complex 3D bar graph?) If yes, for what applications and/or cases is 3D rendering most appropriate? Research in these areas also involves understanding users and their contexts to develop models of human expectations in varying contexts and create techniques to represent and automatically adjust those models based on experience. Key open areas that need continuous improvements: - Maximizing warfighter task throughput - Minimizing training - Minimizing cognitive overload in processing information - Improving User Interface consistency

PM Battle Command

Title: User Interface / Role based

Description: Provide common role based user interface across the ABCS environment, taking into account usability engineering, integration and human factors.

PM Battle Command

Title: Knowledge Management - Data mining, filtering & discovery

Description: The Objective Force is defined now as not only the tactical part of the Army but as extending from the Continental United States (CONUS)/sanctuary base to the foxhole. The AKE construct, consisting of infostructure and knowledge, ties the Army's functionals (G1, G3, etc.) into the development and execution of the AKE construct. The term "Army" in this plan refers to Active Component (AC), Army National Guard (ARNG) and United States Army Reserve (USAR) forces. Research prototype data filtering and discovery mechanisms, network trends, how to operate in the future (apps and comms), event/rule based algorithms, effects on network management to implement a network-centric, knowledge-based decision support capability to facilitate management of change and provide relevant and accessible knowledge to leaders. Key open areas that need continuous improvements: - Mining unstructured data

Areas of Interest:

PM Battle Command

Title: Automated/Adaptive Mission Planning

Description: Provide R&D to extend mission planning, monitoring and execution capabilities in the evolving NECC based environment. Support expansion of decision support services to include running estimates, adaptive planning and execution. The ultimate need is to develop service capabilities that not only improve the decision maker's situational awareness, but also reduce cognitive burden by contributing to the decision process itself. In the Observe, Orient, Decide, Act (OODA) loop, technology enhancements are needed to better orient decision makers to available information. Tactical planning often requires fast decision cycle times; occur with little lead time; and, are associated with rapidly unfolding events. Improve planning service capabilities for surveillance/reconnaissance assets must be improved to maximize coverage area, monitor progress, assess BDA, adjust asset placement, considering effects of target type, terrain, weather, etc. Need to focus on the orchestration of services to provide overall mission capability packages for NECC from an architecture-centric approach to improve decision making and reduce cognitive overload. Capabilities must also be extended to include leveraging evolving of battlespace terrain reasoning and analysis services, and to extend the degree of automation associated with alerts, monitoring of the current situation and automatically updating the plan based on changes in events. Capabilities need to be developed to automatically present commanders with relevant potential Course of Actions (COAs) to choose from. There are too many different projects working from different angles; need to analyze architecture to determine gaps and overlaps to ensure a single cohesive, consistent effort of resources (Proposed DARPA IPTO Program).

PM Battle Command

Title: Non-lethal Effects Based Assessment

Description: Support for research and exploitation of decision aids that will assist the CDR and staff in generating, assessing and visualizing the consequences of employing diplomatic, military, information operations and economic actions singularly or in combinations to achieve effects against the adversary's political, military, economic, social, information and infrastructure systems. The decision aids will also assist the commander and staff in constructing, visualizing and evaluating campaign plans that exploit the impact of multi dimensional effects and the interaction among effects. There are too many different projects working from different angles; need to analyze architecture to determine gaps and overlaps to ensure a single cohesive, consistent effort of resources.

Areas of Interest:

Project Manager
Force XXI Battle Command, Brigade-and-Below (PM FBCB2)

PM FBCB2

Title: C2 Store & Forward capability

Description: Some battle command systems must retain C2 messages when operators are not within radio connectivity of the sender or their system has been turned off. The battle command system operators need to be able to retrieve messages sent while their system was turned off as well as when they log into a new computer on a different platform.

PM FBCB2

Title: Hybrid Comms Networks

Description: The current tactical communications network cannot accommodate the growing number of digitized platforms and the amount of data that is being generated together with the geographic dispersion of the systems. The future will bring about hybrid comms networks that include various LOS and celestial comms. We need to immediately begin analysis, modeling and simulation to understand how these systems can IP route the data at the tactical level.

PM FBCB2

Title: Web Services for Tactical Networks

Description: To take advantage of the planned service based architecture, need to investigate techniques to minimize bandwidth requirements for leveraging web services over disadvantaged communications networks. Techniques to compress maps/imagery and VMF messages would help conserve tactical comms bandwidth.

Project Manager Mobile Electric Power (PM MEP)

PM MEP

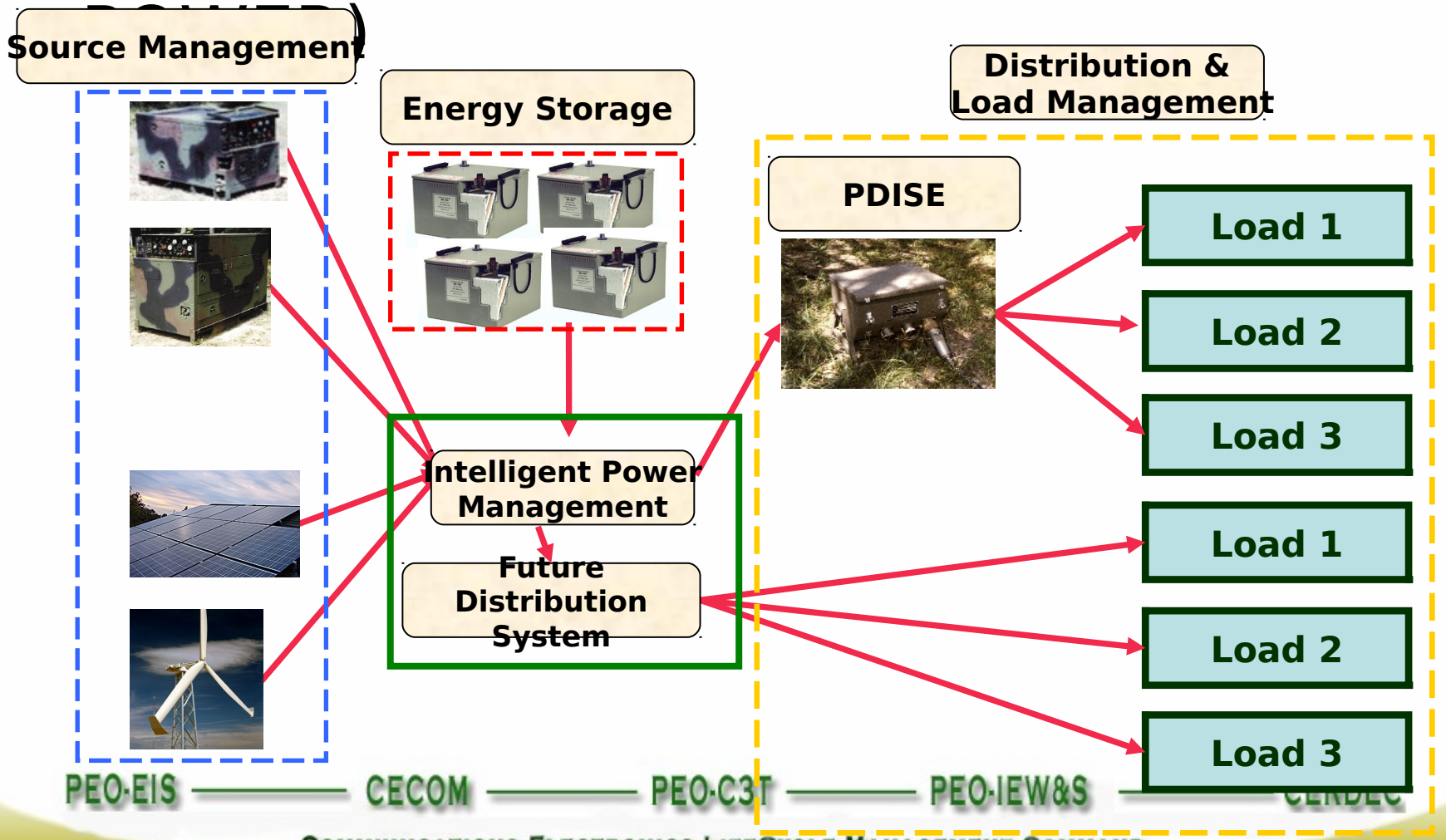
Title: Intelligent / Adaptive Power

Description: Use of Intelligent / Adaptive (I/A) power mechanisms integrated with DOD power system designs will provide future C4ISR platforms with a standard tactical, intelligent power management architecture that incorporates:

- Source Management : automatic control/ synchronization of diverse power sources (i.e., tactical gensets, utility power, vehicles, renewables)
- Power Distribution / Load Management : including load shedding and peak shaving
- Energy Storage: Batteries, Ultra capacitors, etc.
- Renewable sources: Wind, solar, etc.
- Scope: 5 – 750kW

PM MEP

Title: Hybrid-Intelligent Power (HI-POWER)



PM MEP

Title: Extending the Power Spectrum

Description: Fill the power gap between available batteries and the smallest fueled DoD power sources of 500 – 2000 Watts for use with:

- Soldier Battery Recharge
- Unmanned Ground Vehicles
- Silent Watch
- Remote Site Operations
- Small Point Loads (i.e., power tools, laptops, handheld devices)

Benefits include:

- Reducing weight and volume
- Reducing overcapacity and
- Single soldier portable

Challenges include:

- Increasing power density
- Reducing noise and thermal signature
- Meeting weight and fuel consumption objectives

PM MEP

Title: Advanced Materials

Description: Latest materials (synthetic lubes, novel polymers, responsive materials, high-temp electronics) and combustion controls will be used to:

- Improve Power Density (SiC)
- Enhance Thermal Management (SiC and GaN in size restrictive structures)
- Enable Combustion Control (Ceramics and novel polymers)
- Enable Log Fuel Compatibility (Catalysts and support media tolerant to high (3000 ppm) sulfur concentrations)

Project Manager Tactical Radio Communications Systems (PM TRCS)

PM TRCS

Title: Optimizing the SATCOM Architecture of a Multi-access Time Division Multiple Access (TDMA) Network

Description: The Army continues to field more systems to support the Warfighter. These systems will increase in number and place greater demands on the communications infrastructure in terms of lower latency and increased bandwidth. Therefore, strategies are needed to improve the implementation of multi-access satellite communications (SATCOM) network architectures. Potential research avenues may include examining variant SATCOM architectures to identify potential areas of improvement for the current Joint Network Node (JNN) Linkway TDMA network. Examples of improvements include, but are not limited to, software modification and configuration modification within the SATCOM architecture and/or the Internet Protocol (IP) network to improve efficiency and reduce the number of hops between nodes in a multi-access SATCOM network (e.g., TDMA, Code Divison Mutliple Access (CDMA)).

PM TRCS

Title: Wireless IP “Roaming” and “Self Healing” Networking

Description: As the current force transitions, the demand for additional bandwidth, more dynamic and robust network access, On the Move (OTM) networking, the ability to extend the network across dangerous terrain, and rapid deployment of networks will surface. To meet these emerging requirements, there is a need to look beyond the conventional communications architecture of today and consider a more flexible, wireless IP network integration for the Joint Network Node - Network (JNN-N). Many of the current commercially available wireless IP implementations (e.g., WiFi, WiMAX, etc.) enable limited roaming and rudimentary self healing functions for tactical network applications. Further research needs to be performed to determine effective methodologies in deploying a wireless IP-based network to promote mobility of the subscriber throughout the entire network, thus not limiting him/her to their current task organization and allowing the subscriber to draw network services from the most effective link available.

PM TRCS

Title: Integrated C2/EW Suite

Description: Identify opportunities to integrate military systems during vehicle manufacturing/assembly process.

PM TRCS

Title: Next Generation Military Architecture

Description: A general building block architecture consistent with emerging telecom approaches, such as Advanced Telecom Computing Architecture (ATCA), is required to provide a high availability, high performance structure for building next generation network systems.

PM TRCS

Title: Application of Commercial MPLS Network Technologies

Description: As the Army transitions to an all IP network, the inclusion of delay intolerant voice calls and video becomes a significant technical issue. The commercial industry is approaching the inclusion of voice and video by using level 2 networks built on Ethernet and Multi-Protocol Label Switching (MPLS)/IP. The fundamental issue is the best technique to transition traditional circuit based voice and video to a packet based network infrastructure in an efficient and flexible manner.

Project Manager Warfighter Information Network – Tactical (PM WIN-T)

PM WIN-T

Title: Affordable OTM Antenna Technologies

Description: Need to develop affordable (50% cost reduction), small footprint, On the Move (OTM) Antennas (SATCOM, Phased Array and Line of Sight) for ground to space, ground to air, and ground to ground networking systems to support WIN-T's OTM Wide Area Network (WAN).

Specific Areas of Interest / Current Status:

- PM WIN-T is looking for affordable solutions for the Ku, Ka and Q bands. There are currently Army Technology Objectives (ATOs) programs and Small Business Innovative Research (SBIR) efforts looking into this topic; however, Size, Weight and Power and Cost (SWAP-C) are an ongoing concern. Protection for these antennas is also needed through ballistic radomes.

PM WIN-T

Title: Affordable Inertial Navigation

Description: Develop an affordable inertial navigation unit for the purpose of accurately pointing antennas for SATCOM On the Move (SOTM) Applications.

Specific Areas of Interest / Current Status:

- There is a requirement for a low cost, modular inertial navigation capability suitable for use with SOTM antennas. Solutions should allow for a cost vs. performance trade-off.

PM WIN-T

Title: Voice Inter Working Function

Description: A Secure Communications Interoperability Protocol (SCIP) inter-working function that will allow SCIP enabled Voice over Internet Protocol (VoIP) phones to be connected to the unclassified Local Area Network (LAN). This will eliminate the need to run multiple IP voice networks over multiple enclaves.

Specific Areas of Interest / Current Status:

- Currently there is only a single channel inter-working function capability, but the desire is to have a multi-channel (24) inter-working function.

PM WIN-T

Title: High Efficiency Multi-band Power Amplifiers (PA) for Communications at the Halt (CATH)

Description: Today's multi-band SATCOM terminals require individual power amplifiers for each band, which increases production costs and life cycle supportability costs. Higher efficiency power amplifier technology increases terminal performance by increasing the effective linear output power. Linear performance requirements for power amplifiers is crucial for achieving the maximum throughputs available from high order modulation modes on Wideband Global Satellite (WGS) and Transformational Satellite (TSAT).

Specific Areas of Interest / Current Status:

- Desire is to have a high efficiency, Solid State Power Amplifier (SSPA) solution which covers multiple bands. A focus area that should be considered is for a Ka/Q band OTM antenna SSPA solution for WIN-T as part of the TSAT upgrade. Currently there is a proposed (FY09 start) ATO that plans to look at this.